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(54) Title of Invention: Algaecide decomposition detergent component

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Specification

1. Title of invention

Algaecide decomposition detergent component

2. Scope of claims

- (1) Algaecide decomposition detergent component with main ingredient of boron compound
- (2) Algaecide decomposition detergent component made of boron compound mixed with peroxide

3. Detailed description of the invention

Field of the invention

The present invention relates to a detergent for diatoms and algae that are produced in an exhaust water cooling apparatus used in a heat exchanger and the like. In particular, an algaecide decomposition detergent component that kills diatoms and algae and decomposes them enough to be washed off with a cleaning operation.

Prior art and problems

An exhaust water cooling apparatus used in a heat exchanger produces algae in the

water exhaust cooling unit when it is used for extended periods, causing deterioration of cooling efficiency. Moreover, dead algae, whole and in segments, are deposited, which clog up the water exhaust path, often causing the stoppage of the heat exchanger function itself. In order to prevent such a situation, users regularly clean and wash the exhaust water cooling apparatus. In such cases, the users, prior to cleaning, had to mechanically scrape off the algae produced in the exhaust water cooling unit, or to kill the algae with an algacide followed by mechanically scraping-off the dead algae using a brush and the like.

However, spraying water to wash off algae that are scraped off results in the later clogging of the exhaust water, causing greater problems for the circulation system of the apparatus.

In addition, the algae come back over time, no matter how often they are scraped off. For this reason, a method in which algacide such as hydrogen peroxide or hydrochloric acid is mixed with detergent has been adopted. Although the use of such a method helps prolong the cycle of algae reproduction, dead algae, whole and in segments continue to deposit on the wall of the water tank and cooling apparatus. The issue of scraping off algae before washing and clogging of the filter and path by dead algae, whole and in segments, remains unresolved.

Purpose of invention

The present invention, in order to overcome aforementioned problems of the prior art, has the objective of producing a detergent component that enables simplification of operation and prevents clogging of filter and path by killing algae that are produced in the exhaust water cooling apparatus of the heat exchanger and the like and further decomposing the dead algae enough to be washed off completely.

Problem resolution means

The present invention is described in detail hereafter, with reference to an actual embodiment.

In order to overcome the aforementioned problems associated with the prior art, the present invention provides an algacide decomposition detergent that kills algae,

prolongs the regeneration cycle, and decomposes dead algae residue for easy cleaning and discharge.

Experiments show that inorganic acid such as hydrochloric acid, sulfuric acid or nitric acid, organic acid such as oxalic acid, or hydrogen peroxide is effective as an algaecide. However, these acids function only as an algaecide, and have no effect whatsoever for the decomposition of the algae.

As a result of further experiments, it was found that use of peroxides in the presence of boric acid compounds display a remarkable effect on the decomposition function as well as algaecide capability.

Boric acid (H_3BO_3), sodium perboric acid ($\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$), zinc boric acid, phosphate boric acid ($\text{K}_2\text{B}_4\text{O}_7 \cdot 8\text{H}_2\text{O}$), calcium boric acid ($\text{CaB}_4\text{O}_7 \cdot 6\text{H}_2\text{O}$), magnesium boric acid ($\text{Mg}(\text{BO}_2)_2 \cdot 8\text{H}_2\text{O}$), sodium boric acid ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$), manganese boric acid ($\text{MnB}_4\text{O}_7 \cdot 8\text{H}_2\text{O}$), and lithium boric acid ($\text{LiB}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$) are used as boric compound, and hydrogen peroxide was used as peroxide. Mixed solution composed of 20g (weight gram) of each boric compound, and 200g (weight gram) of hydrogen peroxide with 30% concentration was poured into an experimental tank in which algae were produced. The total decomposition, separation and removal of algae from tank wall were confirmed after 24 hours of injection.

In addition to hydrogen peroxide, a similar effect was confirmed for peroxide such as magnesium peroxide (MgO_2), sodium peroxide (Na_2O_2), barium peroxide (BaO_2), oxalic acid ($\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$), perhydrochloric acid, permanganic acid, persulfuric acid perchloric acid, or perphosphoric acid.

It was also revealed that the concentration and/or mixture ratio of each component solution may be adjusted depending on the size of water tank requiring the algaecide and decomposition as well as production and attachment condition of the algae in the exhaust water cooling apparatus, when the component solution is used as a detergent component.

Efficacy

The present invention, in addition to killing algae produced and attached to the water tank and exhaust water cooling apparatus of the heat exchanger, which was considered difficult in the prior art, decomposes algae to a level at which they may be washed off and removed completely, enabling thorough cleaning of the apparatus without concern of clogging the filter and water path associated with cleaning the tank and the exhaust water cooling apparatus, and prolongs the cycle of algae regeneration.

Moreover, in order to totally prevent algae regeneration after the completion of cleaning, a mixture of a super saturated boric compound with hydrogen peroxide should be added to the cooling water, at the rate of 1% per day, which will totally prevent the production of algae.

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